TERMINAL DEVICE WITH BUILT-IN IMAGE SENSOR

BACKGROUND OF THE INVENTION

1. Industrial Field of Utilization

The present invention relates to a terminal device with built-in image sensor as an information appliance to be used in place of a memo pad capable of easily taking in handwritten characters or pictures or documents of printed matter, or the like, in a portable terminal device, personal computer, and the like.

2. Related art of the Invention

Recently, as the information appliances are becoming smaller in size and the information communication technology is extremely advanced, the demand for portable terminal devices is increasing abruptly.

Features of such terminal device include capability of filing of information of large capacity in small size and light weight, provision of handy input means for handwriting instead of a memo pad, and connection with communication line for transmitting and receiving data, among others.

As a result, for example, a businessman does not have to carry a large volume of documents on his business trip, and new information can be transmitted and received by connecting with the communication line from a staying place, and it provides very convenient high functions for business people.

It is hence highly expected to be a business tool in the multimedia age.

At the present, however, there are still many problems.

In particular, the conventional handwritten input means was designed to write characters or pictures directly on the touch panel provided in the front panel of the liquid crystal surface, and it was hard to use as compared with the conventional writing tool.

Besides, when taking in the printed document such as visiting card and map, a scanner or other peripheral device was separately needed.

The problems of the conventional handwritten input means are specifically described. First, to prevent the polyester film on the surface of the touch panel from being damaged, the writing tool is a special plastic pen of high sliding performance, and as compared with the conventional writing tool, it is hard to write character or picture, and when used for a long time, the surface of the touch panel is injured.

Or, when writing characters or pictures by using conventional writing tools such as pen and pencil, by writing while observing the handwriting, pictures and characters can be written as intended, but in the conventional handwritten input means, a limited handwriting is displayed depending on the resolution of the touch panel, the resolution of the liquid crystal, and the thickness of the furnished writing tool, and the writing area (touch panel) and handwriting display area (display unit) are different members, and it is hence hard to enter the characters or pictures exactly as intended.

Still more, when writing characters by conventional writing tools such as pen and pencil, individual and characteristic letters can be written depending on the size of characters or pressure on the pen, but when writing characters on the touch panel of resistance film type, a constant pressure is always required, characters and pictures appear to be similar and inexperienced if written by whoever as compared with the writing by the conventional tool. On the other hand, when taking in printed documents such as visiting card and map, a reading scanner or other device was separately needed.

SUMMARY OF THE INVENTION

To solve the above problems, it is hence an object of the invention to present a terminal device with built-in image sensor capable of reading a document or further a long document, allowing to write input characters and pictures easily, and assuring rigidity while realizing smaller size.

A terminal device with built-in image sensor of the present invention comprises

a display unit for displaying information such as character and picture,

a transparent panel disposed at the front panel of said display unit, and

an image sensor disposed movably between said display unit and said transparent panel, for scanning the surface of said transparent panel,

wherein said image sensor comprises a lens member disposed so that the optical path may be substantially parallel to said transparent panel surface, a prism member for bending the optical path so that one focal position of the lens member may be adjusted to the surface of said transparent panel, and that the light coming from the direction of the transparent panel may enter said lens member, a light sensor disposed at other focal position of said lens member, and a light source for irradiating said transparent panel surface with light.

In this constitution, since the members of the image sensor (lens member, prism member, light source, light sensor) are disposed parallel between the transparent panel and display unit, a thin image sensor is realized.

The prism member of this constitution is a transparent material of high refractive index of 1.5 or more, or is such transparent material of high refractive index forming a reflection preventive film on the surface, and hence the optical path folding at right angle by prism member can be substantially extended in length, and the efficiency of the light source can be enhanced. As a result, a sufficient allowance is given to the device design and processing precision, and reading of high picture quality is realized.

A terminal device with built-in image sensor of the present invention is that

roller means for moving a document is rotatably provided at one side vertical to the moving direction of the image sensor on the transparent panel surface, said image sensor has a reading width in a specific length to the direction of the vertical side, and can stop at a position corresponding to the position of the roller means, and can read the moving document, being held between the transparent panel and roller means, at its stopping state position.

In this constitution, by moving the image sensor, it is possible to read a document in a size as large as the transparent panel. Moreover, when reading a document longer than the length of the transparent panel, with the image sensor stopped at the position of the roller means, by inserting the document between the roller means and transparent panel and moving that document, a longer document can be read.

A terminal device with built-in image sensor of the present invention comprises

a main body incorporating a display unit for displaying information such as character and picture,

a transparent panel disposed at the front panel of said display unit,

an image sensor disposed movably between said display unit and transparent panel for scanning the surface of said transparent panel,